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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/718,780

11/20/2003

Mehrdad Nikoonahad

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06/10/2004

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EXAMINER

BARTH, VINCENT P

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 06/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/718,780

Applicant(s)

NIKOONAHAD, MEHRDAD

Examiner

Vincent P. Barth

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-17 and 20-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Referring to Claims 1, 20 and 23, the term, “parameter” is used in a manner which renders the claim indefinite. MPEP §2173.02 states that, “If the scope of the invention sought to be patented cannot be determined from the language of the claims with a reasonable degree of certainty, a rejection of the claims under 35 U.S.C. 112, second paragraph is appropriate.”, citing In re Wiggins, 488 F.2d 538, 179 USPQ 421 (CCPA 1973). The use of the term “parameter” contains no limitations, therefore those seeking to practice the invention can not reasonably ascertain the metes and bounds of the claim. Various optical, thermal, acoustical/vibrational, electrical, chemical or dimensional parameters, or some combinations thereof, are all well known in the art to be measurable “parameters” of semiconductor substrates that provide “characterizations” of the surface, and could be reasonably construed to be within the scope of the claim. However, the claims have been discussed below as each may best be understood.
4. Referring to Claims 2-17, 21, 22, 24 and 25, the fourth paragraph of 35 U.S.C. §112 provides that, “A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers”. Accordingly, Claims 2-17, 21, 22, 24 and 25 inherit

Art Unit: 2877

the §112 second paragraph rejection of Claims 1, 20 and 23, and are therefore rejected as well.

However, the claims have been discussed below as each may best be understood.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 7, 10, 12, 14, 18-20, 23 and 24 are rejected under 35 U.S.C. §102(b) as being anticipated by Isozaki, U.S. Pat. No. 6,115,117 (5 Sept. 2000).

7. Referring to Claims 1-3, 7, 10, 14, 18 and 19, Isozaki discloses a system for inspecting the surface of a semiconductor, and determining the three-dimensional coordinates of foreign particle defects (col. 3, lns. 55-56). Isozaki discloses that the system impinges a beam of light from a light source 110 upon the wafer 111, which is rebounded and scattered from the surface (col. 2, ln. 64) into an optical receiving system 116, during which inspection a rotational displacement sensor 118 rotates the beam relative to the wafer (Fig. 1). Isozaki discloses that the measurement data output by the photoelectric converting element (col. 3, ln. 27; col. 3, ln. 40) is processed by a height detecting circuit (col. 3, ln. 33), which determines the parameter of three-dimensional coordinates of the foreign particles.

8. Referring to Claim 12, Isozaki discloses a focusing lens in the light source generating unit 110, although the lens itself is not separately identified by a numeral and lead line (Fig. 1).

Art Unit: 2877

9. Referring to Claims 20, 23 and 24, Isozaki discloses a system for inspecting the surface of a semiconductor, and determining the three-dimensional coordinates of foreign particle defects (col. 3, lns. 55-56). Isozaki discloses that the system impinges a beam of light from a light source 110 upon the wafer 111, which is rebounded and scattered from the surface (col. 2, ln. 64) into an optical receiving system 116, during which inspection a rotational displacement sensor 118 rotates the beam relative to the wafer (Fig. 1). Isozaki discloses that the measurement data output by the photoelectric converting element (col. 3, ln. 27; col. 3, ln. 40) is processed by a height detecting circuit (col. 3, ln. 33), which determines the parameter of three-dimensional coordinates of the foreign particles. Isozaki discloses a spectrum of signal data, from which determinations concerning the surface defects are derived (Fig. 2).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 4-6, 8, 9, 13, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isozaki, U.S. Pat. No. 6,115,117 (5 Sept. 2000).

12. Referring to Claims 4 and 5, Isozaki discloses an optical receiving system 116 which senses the light scattered from the wafer by a photoelectric converting element. Although

Isozaki does not explicitly disclose that such element may be a photodiode or photomultiplier tube, such elements are photoelectric elements. Therefore, the features claimed are implicit in the reference. See MPEP §2144.01.

13. Referring to Claim 6, Isozaki discloses that the light reflected and scattered from the wafer is “sensed by a photoelectric converting element *through an optical system* (not shown)” (col. 4, lns. 11-15, emphasis added). Those of skill in the art would generally understand light passing “through” and “optical system” to imply that appropriate lenses or other focusing means would be implemented when desired by those practicing the invention. See MPEP §2144.01.

14. Referring to Claims 8 and 9, Isozaki discloses that the system impinges a beam of light from a light source 110 upon the wafer 111 generically, without specifying whether the source is broadband or narrowband, such as a laser. However, since the disclosure in Isozaki is generic, those practicing the invention would expect both light sources to be alternative embodiments within the disclosure, and thus implicit in the reference. See MPEP §2144.01.

15. Referring to Claim 13, Isozaki discloses that the wafer is rotated by element 118, without illustrating an alternative in which the measurement means are rotated instead. However, the Isozaki disclosure also describes the rotation of the wafer and the measurement system “relative with respect to each other” (col. 2, lns. 8-10). Thus, the reference implies that an alternative in which the measurement system is rotated is within the scope of the disclosure. See MPEP §2114.01.

16. Referring to Claim 15, Isozaki discloses that the wafer is rotated by element 118, which is driven by motor 120 (Fig. 1).

17. Referring to Claims 21 and 22, Isozaki discloses all of the features claimed, but does not explicitly disclose the type of wafer structure, such as interconnects and Damascenes. However, the wafer structures claimed are non-limiting statements of intended use, which do not distinguish the invention over the prior art. Claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. See MPEP§2114, citing In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). “[A]pparatus claims cover what a device *is*, not what a device *does*.” Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990, emphasis in original). Accordingly, the limitations claimed would have been obvious to those skilled in the art at the time of the invention.

18. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isozaki, U.S. Pat. No. 6,115,117 (5 Sept. 2000), in view of McNeil, et al., U.S. Pat. No. 5,867,276 (2 Feb. 1999).

19. Referring to Claim 11, Isozaki discloses all of the features claimed, and generically discloses a light source 110, but does not disclose the wavelength range of the source, such as light in the x-ray range. McNeil discloses a scattering system in which the light source has a broad spectral composition (col. 1, ln. 56), and which can include x-ray light, through the visible range, through microwave regions (col. 4, lns. 8-10). Although the scattering system modifies the prior art in which a rotational stage is used, the disclosure therein does not preclude such relative rotation, and in fact uses such prior art in illustrations of its modified invention (col. 3, lns. 19-41). McNeil and Isozaki are analogous art, since they are from a similar problem solving area, in that each involves scatterometry. See Medtronic, Inc. v. Cardiac Pacemakers, 721 F.2d

1563, 1572-1573, 220 USPQ 97, 103-104 (Fed. Cir., 1983). The motivation for combining the reference would have been to illustrate that broadband light sources, from x-ray light, through the visible range, through microwave regions, are suitable for scatterometry, including in systems in which the substrate and the optics move relative to each other. Accordingly, it would have been obvious to those skilled in the art to combine the references, at the time of the invention, in order to obtain such benefit.

20. Claims 16, 17 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isozaki, U.S. Pat. No. 6,115,117 (5 Sept. 2000), in view of Rangarajan, et al., U.S. Pat. No. 6,556,303 (29 Apr. 2003).

21. Referring to Claims 16 and 25, Isozaki discloses all of the features claimed, including processing the optical data scattered from the wafer surface, but does not explicitly disclose that such data may be compared to mathematical models of the structure. Rangarajan discloses a scatterometry system upon a rotational stage 113, in which a three-dimensional structure is analyzed (Fig. 5b). Rangarajan discloses that databases may be mathematically calculated *a priori* to provide scatterometry models, following which scatterometry measurements can be compared (col. 7, lns. 17-39). Isozaki and Rangarajan are analogous art, since they are from a similar problem solving area, in that each involves scatterometry. See Medtronic, Inc. v. Cardiac Pacemakers, 721 F.2d 1563, 1572-1573, 220 USPQ 97, 103-104 (Fed. Cir., 1983). The motivation for combining the reference would have been to provide for further processing, as disclosed in the Rangarajan reference, than that shown in the Isozaki reference. Accordingly, it



would have been obvious to those skilled in the art to combine the references, at the time of the invention, in order to obtain such benefit.

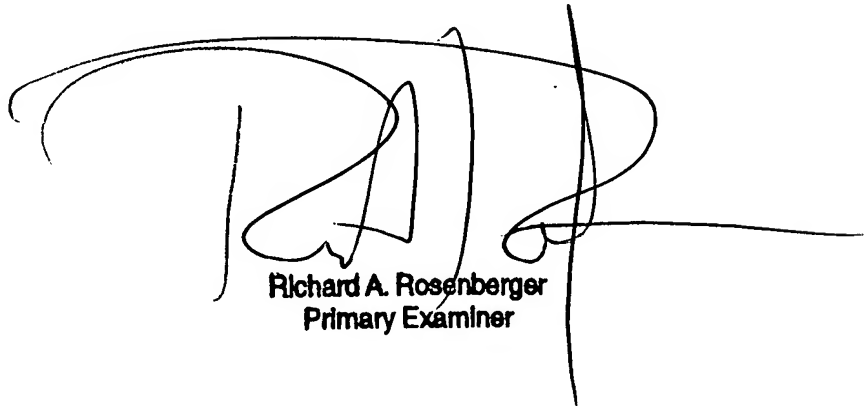
22. Referring to Claim 17, Isozaki discloses all of the features claimed, including processing the optical data scattered from the wafer surface, but does not explicitly disclose that such data may be processed by a neural network. Rangarajan discloses a scatterometry system upon a rotational stage 113, in which a three-dimensional structure is analyzed (Fig. 5b), and in which the data is used to train a neural network (col. 7, lns. 51-56). Isozaki and Rangarajan are analogous art, since they are from a similar problem solving area, in that each involves scatterometry. See Medtronic, Inc. v. Cardiac Pacemakers, 721 F.2d 1563, 1572-1573, 220 USPQ 97, 103-104 (Fed. Cir., 1983). The motivation for combining the reference would have been to provide for further processing, as disclosed in the Rangarajan reference, than that shown in the Isozaki reference. Accordingly, it would have been obvious to those skilled in the art to combine the references, at the time of the invention, in order to obtain such benefit.

### *Comments*

23. The listing of references in the Specification is not a proper Information Disclosure Statement (IDS), as Applicants have set forth such references on page 2 in the Specification of the instant Application. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states that the list may not be incorporated into the specification but must be submitted in a separate paper. Applicants must provide an appropriate IDS on a form PTO-1449 prior to, or concurrent with, the reply to the instant Office Action.

***CONCLUSION***

24. Applicants' Claims 1-25 are rejected based on the reasons set forth above.
25. Any inquiries concerning this communication from the Examiner should be directed to Vincent P. Barth, whose telephone number is 571-272-2410, and who may be ordinarily reached from 9:00 a.m. to 5:30 p.m., Monday through Friday. The fax number for the group before final actions is 703-872-9306.
26. If attempts to reach the Examiner prove unsuccessful, the Examiner's supervisor is Frank G. Font, who may be reached at 571-272-2415.
27. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.



Richard A. Rosenberger  
Primary Examiner